

Riemann-Hilbert analysis for polynomials orthogonal on the unit circle

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The steepest descent analysis of Deift and Zhou, based on the matrix Riemann-Hilbert characterization proposed by Fokas, Its and Kitaev, has proved to be a very strong technique for the study of the analytic properties of orthogonal polynomials. We apply it to polynomials orthogonal with respect to a weight supported on the unit circle in two cases.

First, We provide a complete asymptotic expansion for the sequence of orthogonal polynomials when the weight is strictly positive and analytic. These formulas are valid uniformly in the whole complex plane. Second, we consider the situation when this weight is modified by some factors containing zeros. As a consequence, in both cases we obtain results about the distribution of zeros of the orthogonal polynomials.

This is a joint work with K. T.-R. McLaughlin and E. B. Saff.